

Serial No. 10/642,438

Docket No. SACHP0145US

**In the Specification:****On page 1, please amend paragraph [0003] as follows:**

Other properties of ionic liquids have also proved advantageous. For example, many ionic liquids have a broad temperature range at which they remain liquid and also are stable over a broad pH range. This is beneficial for high temperature processes with a demanding pH. Further, some ionic liquid systems can be used as both a solvent and catalyst. For example, ~~bmim~~ BMIM-Al<sub>2</sub>Cl<sub>7</sub> and ~~emim~~ EMIM-Al<sub>2</sub>Cl<sub>7</sub> can be employed as a solvent and catalyst in Friedel-Crafts reactions wherein ~~bmim~~ BMIM is 1-butyl-3methylimidazolium and ~~emim~~ EMIM is 1-ethyl-3-methylimidazolium.

**On page 5, please amend paragraph [0017] as follows:**

For hydrophobic ionic liquids R<sub>1</sub>, R<sub>2</sub>, R<sub>4</sub> and R<sub>5</sub> are preferably independently selected from alkyl groups having about five or more carbon atoms, preferably from about six to about eighteen carbon atoms. One preferable group for R<sub>1</sub>, R<sub>2</sub>, R<sub>4</sub> and R<sub>5</sub> is ~~—CH<sub>2</sub>—CH(CH<sub>2</sub>CH<sub>3</sub>)(CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>)—~~ —CH<sub>2</sub>—CH(CH<sub>2</sub>CH<sub>3</sub>)(CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>)—. This group is useful for the properties it gives to the ionic liquid and for its cost and convenience to manufacture.

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**On page 10, please amend paragraph [0042] as follows:**

In one embodiment, two or more ionic liquids are blended together to form an improved reaction solvent. It is believed that Lewis Acid ionic liquids can be advantageously blended with ionic liquids based upon docusate or docusate variants to form an improved reaction solvent that provides better mixing between reactants to improve reaction kinetics. Because the docusate and docusate variant ionic liquids tend to be at least relatively miscible with the hydrocarbon streams, they tend to inhibit the formation of two phases and improve the mixing and contact between the reactants. Examples of Lewis Acid ionic liquids that are believed to be useful in making blends with the sulfonate anion (e.g., docusate and docusate variant) ionic liquids of the present invention are disclosed in copending U.S. Application entitled "Lewis Acid Ionic Liquids," filed on August 15, 2003 and invented by Roger Moulton (Serial No. currently unknown 10/642,437, and published as US 2004/0122229), which is incorporated by reference as if fully set forth herein.

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**At page 11, prior to [0044], please insert the following THREE PARAGRAPHS of text, which was incorporated by reference from U.S. Appl. No. 10/642,437 in [0042] above:**

Y may be an integer but it also includes decimals when there are non-stoichiometric amounts of the aluminum anion. In these cases, the aluminum anion will be mixed with other anions such as halides. Thus, ionic liquids of the present inventions include compositions comprising, for example, a quaternary ammonium chloride mixed with a quaternary ammonium aluminum chloride. The aluminum chloride can be, for example, tetrachloroaluminate or heptachlorodialuminate.

The R group and the value of y in the anion are usually selected based on the desired properties of the ionic liquid. For example, if the ionic liquid is going to be used as a Friedel-Crafts catalyst then particularly preferred anions are aluminum chloride anions such as  $\text{AlCl}_4^-$  and  $\text{Al}_2\text{Cl}_7^-$ .

When one or more R groups are a halogen group the halogen is preferably chloride, bromide or iodide. When one or more R groups is an alkyl group then the alkyl group should have a sufficient number of carbon atoms so that the ionic liquid has the desired properties. For example, if the ionic liquid is to be used as a catalyst then the total number of carbon atoms in the ionic liquid should be selected so as to maximize the catalyst's effectiveness and efficiency. The total number of carbon atoms may also affect other properties of the ionic liquid such as vapor pressure, dipole moment, polarity, etc.

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**On page 11, please amend paragraph [0045] as follows:**

Another suitable cation for the Lewis Acid ionic liquid are the N-alkyl substituted saturated heterocycles such as piperidinium and morpholinium. In particular, piperidinium substituted on the nitrogen with an alkoxy or alkyl group such as –  
 $(\text{CH}_2)_2\text{OMe}$   $(\text{CH}_2)_2\text{OCH}_3$ , butyl, or propyl are particularly beneficial. Pyrrolidine-based cations can also be employed. The cation may include ether functionality (e.g.,  $\text{NCH}_2\text{CH}_2\text{OCH}_3 + \text{NCH}_2\text{CH}_2\text{OCH}_3^+$ ). The cation may include halogenated alkyl groups.

**On page 11, please amend paragraph [0046] as follows:**

Exemplary Lewis Acid ionic liquids for the blend include ionic liquids having an aluminum chloride anion and a cation sourced from an ammonium salt such as  $\text{MeBu}_3\text{N Cl}$   $\text{MeBu}_3\text{N Cl}$ ,  $\text{Me}_3\text{PentyN Cl}$   $\text{Me}_3\text{PentyN Cl}$ ,  $\text{Me}_3\text{ButyN Cl}$   $\text{Me}_3\text{ButyN Cl}$ ,  $\text{MeEt}_3\text{N Cl}$   $\text{MeEt}_3\text{N Cl}$ ,  $\text{Me}_2\text{Et}_2\text{N Cl}$   $\text{Me}_2\text{Et}_2\text{N Cl}$ ,  $\text{Cl}-\text{CH}_2-\text{NMe}_3\text{ Cl}$   $\text{Cl}-\text{CH}_2-\text{NMe}_3\text{ Cl}$ , or N-methyl-N-Butyl Pyrrolidinium Cl. Other exemplary Lewis Acid ionic liquids include N-alkyl substituted piperidinium heptachlorodialuminate, trimethyl chloromethyl ammonium heptachlorodialuminate, trimethylbutyl ammonium heptachlorodialuminate, and tributyl methyl ammonium heptachlorodialuminate.

**On page 14, please amend paragraph [0068] as follows:**

(N-methyl-N-( $\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ ) ( $\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ ) pyrrolidinium): 0.86 (t), 1.31 (m), 2.11 (m), 3.0-4.2 (complex overlapping m)